Overseas Labs Play Vital Role in U.S. Biocontrol Efforts

We've seen trees destroyed by gypsy moths, and we know about the threats posed by the fire ant, the emerald ash borer, and the Africanized honey bee. Lesser known—but equally destructive—invasive pests are also threatening some of our most important crops and native plants. The Asian soybean aphid is fast becoming a major problem for Midwestern soybean farmers. The bushy saltcedar, a deciduous tree brought to the United States for erosion control in the 1800s, is crowding out native willow and cottonwoods on more than a million acres along western waterways.

ARS considers the search for natural enemies to combat invasive plants and insects a top priority and funds 66 major biocontrol projects. One facet of the agency's reach—one that puts us in a unique position to do battle with the onslaught of invasives—is the staff of 44 ARS-funded scientists and technicians working at labs overseas.

USDA set up its first overseas laboratories in Paris in 1919. The European facility, now located outside the city of Montpellier, was joined by ARS labs that opened in Hurlingham, Argentina (1962), Beijing, China (1988), and Indooroopilly, Australia (1989). Together, these labs are building an impressive record of success, with discoveries of natural agents to control pests as varied as Asian soybean aphid and saltcedar.

Their work is rooted in a simple concept: If a pest is thriving unchecked in a new environment, find a predator or parasite that eats or attacks it in its original habitat, where both co-evolved. If tests show the biocontrol is safe and effective, import it and use it. Moreover, such an approach is both economical and environmentally friendly. Once a biocontrol proves successful, it reduces or eliminates the need for pesticides and other costly eradication measures.

Having overseas labs is a practical way for ARS scientists to work with local landowners and biologists to study the targeted insect or weed in its native range. As a first step, researchers must study the organism's biology and evaluate the impact of a candidate biocontrol in its native range and then examine its behavior, diet, and other factors to see if it will be effective. That kind of fieldwork often covers broad areas, and having a lab in the country makes it much easier to gain the access, acceptance, and recognition required for such exploration. Try wandering around collecting plants or insects in a foreign country without such connections, and you won't get very far.

Moreover, the stakes are enormous. The Asian longhorned beetle, which made its U.S. debut in New York's Central Park in 1996, threatens much of North America's $3.8 billion hardwood and ornamental tree industry. Olive fruit flies are threatening California's $33.9 million olive industry. The yellow starthistle, one of at least 4,000 to 5,000 exotic plants now established in the United States, has infested more than 10 million acres of rangeland in western states.

Potential biocontrols are subject to strict review and quarantine procedures before release. That quarantine process and the studies themselves can take years, but the work pays off. The South American Biological Control Laboratory in Argentina has examined 250 natural enemies of invasive pests and successfully released 23 biocontrols over the years. Another 18 are now being monitored at the lab's facilities and are due to be released soon.

The work is never easy. Every organism has its own diet, habitat range, morphology, reproductive system, survival strategies, and unique ability to adapt to changing conditions. This range of diversity makes finding the right predator for a particular pest particularly challenging.

Consider the effort to curb melaleuca *(Melaleuca quinquenervia),* a fast-growing tree native to Australia. The elm-shaped tree grows in moist, aquatic areas and does little damage in California, where it is grown as an ornamental. But it crowds out native vegetation in Florida and is threatening to take over parts of the Everglades. In their search for a biocontrol, researchers had to test 450 weevils and other organisms that feed on the fast-growing tree to determine the best candidate for combating it. After exhaustive greenhouse testing, they settled on a tiny grey-brown weevil, *Oxyops vitiosa*—now thriving in south Florida.

Two factors make invasive species a continuing threat. Invasive plants are often among the first to colonize disturbed parcels. As worldwide populations increase, pressures will mount to put more of what land remains available under the plow and to turn meadows and woods into residential communities. That means more disturbed habitat for invasives. Moreover, increased international travel is bringing more freight traffic and more people into new areas. More people and goods moving around means more fruit, seeds, insects, herbs, ornamentals, and other plant life brought to new areas and insects hitching rides in packing crates and cargo holds.

Considering what science is telling us about invasives, and how society is contributing to their proliferation, the research has never been more vital.

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